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EARLY EMBRYOLOGY OF THE WORKER BEE.

The Embryology of the Honey-Bee. By Dr. J. A. Nelson. Pp. 282. (Princeton: University Press; London: Oxford University Press, 1915.) Price 8*s.* 6*d.* net.

THE author of this book describes himself as Expert in Bee Culture Investigation, Bureau of Entomology, U.S. Department of Agriculture. From such an expert one would naturally expect a book full of interesting particulars about the modifications of development in the bee induced by the social habits of this insect and its method of feeding its young. The reader who entertains any such expectation will be severely disappointed; the book deals only with the early development of the egg of the worker bee, and carries the life-history only to the stage when the bee escapes from the egg-shell and begins its life as a grub inside a cell of the honeycomb.

The book, therefore, is almost without significance for the bee-culturist, but from the point of view of the student of comparative embryology it is a production of very great interest, and is to be warmly commended. It comprises a most painstaking and detailed study of the processes of segmentation and "formation of the layers" in the bee's egg, followed by a full and satisfactory description of the development of the nervous system, of the respiratory system, muscles, heart, genital organs, etc. It might, indeed, be regarded as a first-class elementary text-book on insect embryology were it not for the obvious fact that the bee is not a very good choice as a type of insect development. But the comparative embryologist must often choose the types which he can get, not those which he would prefer, and as the first pre-requisite of sound embryology is to obtain abundant material comprising stages separated by very short intervals, it must be admitted the bee offers a better opportunity of accomplishing this end than many more primitive insects. The segmentation of the mesoderm is, however, much less marked in the bee-embryo than in the lower types, and no vestiges of abdominal appendages appear in the course of the development.

On practically every point the author confirms the conclusions arrived at by Hirschler in his study of the development of the beetle Donacia, which is by far the most thorough and satisfactory investigation of the development of any insect which had appeared up to the date of its publication (1909). All our ideas on the early stages of insect development had been thrown into confusion by Heymons. This author asserted that in the higher insect the endoderm, which in the lower types forms the epithelium of the mid-gut, had totally disappeared, and that in these higher types this epithelium was formed from two bands of cells of ectodermic origin attached to the inner ends of the stomodæum and proctodæum respectively. These conclusions of Heymons were frequently used to discredit the doctrine of the fundamental importance of the distinction between the germ-layers, a doctrine which all recent and careful research has tended to re-establish and extend. Hirschler showed that Heymons had confounded an earlier pair of invaginations of the outer cells into the yolk, which can be compared to the process of gastrulation in less yolky eggs, with a later and totally distinct pair of similar invaginations which give rise to the stomodæum and proctodæum. The reader will find that Hirschler's statement receives valuable and convincing confirmation in the volume before us.

The book is well illustrated, most of the figures being interspersed with the text in the vicinity of the portions to which they refer, whilst some plates giving excellent representations of the whole egg in various stages of development are collected at the end. The book will prove to be an indispensable adjunct to every zoological library.

E. W. M.

SOCIOLOGY AS A SCIENCE.

Outlines of Sociology. By Prof. F. W. Blackmar and Prof. J. L. Gillin. Pp. viii+586. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1915.) Price 8*s.* 6*d.* net.

THE ancient academic problem of "free will" is always with us; the study of it is never barren, for its meaning changes with the development of society and of social intelligence. As compared with the state of the problem in the time of Hume, for example, the present-day aspect of it is decidedly more clear and scientific. It may be put in Cooley's words: "no man really acts independently of the influences of his fellow men." "Everywhere," so Profs. Blackmar and Gillin put it, "there is a social life, setting limitations and predominatingly influencing individual action. In government, in religion, in industry, in education, in family association—in everything that builds up modern life, men are co-operating. They work together, combine and organise for specific purposes, *so that no man lives to himself.*"

Sociology has often been derided as a pseudo-science; but in its early stages every science has received the same contumelious treatment. Chemistry was once alchemy; astronomy was once astrology. But British, American, French, and German thought has sealed the success, or at least the usefulness, of the youngest of the sciences, which, after all, is one of the oldest; Plato's "Republic" is a sociological investigation. And, *a priori,* if there is order in the process of society-building; if "through it all runs a constant purpose, a social trend; if there are laws controlling the movement of human society; forces in continual action impelling it forward in well-defined lines"—then there is clearly a mass of facts capable of classification, social phenomena more or less frequently recurring, and movements

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more or less regular, which admit of scientific study and analysis. As for the relation of sociology to other social sciences, "while economics, political science, or ethics may deal with specific laws relating to parts of society, sociology deals with the general laws which apply to the whole structure"; "it occupies much the same position with reference to the social sciences that biology holds to the natural sciences dealing with organic phenomena."

Sociology is essentially a co-operative study; no great individual genius can epitomise it and stamp it with his own theory. What the "social mind" is to society, sociology, in a sense, is to the social sciences; and, as Ellwood says, "the term social mind is a convenient term to express the unity of our mental life." One danger that may threaten sociological science is the possibility of becoming academic. Few studies have more inducements for the armchair philosopher. The cure for this tendency is in the highest ideal of sociology, viz., creative work in the amelioration of social pathology. The only sphere for the realisation of this ideal is field-work, the study of living conditions. To this all antiquarianism and historical investigation must be subordinated. For instance, an investigation into the causes of poverty in a particular country, carried out personally, would be a valuable factor for progress. It is just in this kind of creative work that the State can make use of the science, as it is beginning to do, while the science should place itself at the service of the State. This is true of every science. But the duty of the State is no less plain: it must encourage, organise, and subsidise all the sciences, without the cumbrous pomp and delays of Royal Commissions, but on simple business lines.

The war has begun to drive home this elementary truth. At the stage of civilisation now attained, it is preposterous that the State should not realise its function and duty—that is, to secure the increasing well-being of the society and the individuals over whom it presides. To effect this result is impossible on merely political and legal bases; science is the only sane foundation of national prosperity and progress, and therefore the main concern of the State should be with science. And sociology is a sort of middle-man between the sciences and their utilisation by the State. There is probably not a single department, either of the social or individual life (the political counts merely as a phase of the social, artificially maintained in relation to the State) which is not more or less haphazard in its theory and practice. We do not want to substitute for painful experience and rule-of-thumb any theoretical fads, but we may certainly claim, in a scientific age, that the best results of applied science should form the material for State-development of the national possibilities. Otherwise we are left with the barbarous creed of *laissez-faire,* of which "muddle through" is the proper and most apt translation.

Everything of the best in recent sociological interpretation seems to be included in this text-book of Profs. Blackmar and Gillin; it is quite the most impartial, reasoned, and sound of *résumés* of the subject, most of which, by the way, together with original theory, has recently emanated from America.

To illustrate the needs of a relation between sociology and the State, the authors' remarks on "social surveys" are in point. They mention the great work of Mr. Charles Booth, "who devoted his fortune and a great part of his later life to a study of social conditions in London," also Mr. Rowntree's study of York, Miss Jane Addams's "Hull House Maps and Papers," and others. "A number of places have introduced this method of social stocktaking." But "as practised at the present time by the professional, social, and educational surveyor, it is liable to be brought into disrepute." "There is great need of a standardisation of methods and a perfecting of technique." In other words, there is needed for this, as for every other sociological survey and any practical application of science to national purposes, a central organisation. Such can only be supplied by the State, but there is always the danger of that *corruptio optimi,* red tape, of which, however, the best cure is scientific training.

A. E. CRAWLEY.

EUCLID'S BOOK ON DIVISIONS OF FIGURES.

Euclid's Book on Divisions of Figures, with a Restoration based on Woepcke's Text and on the "Practica Geometriae" of Leonardo Pisano. By Prof. R. C. Archibald. Pp. viii – 88. (Cambridge: At the University Press, 1915.) Price 6*s*. net.

A TYPICAL problem of the *Divisions* is "to cut off a certain fraction from a given triangle by a line drawn from a given point within the triangle." Of the thirty-six propositions of the book, six are auxiliary, two deal with areas the boundaries of which are partly or wholly circular; the rest are concerned with the division of triangles and quadrilaterals. For several reasons the treatise is very interesting; it is apparently complete, the Arabic text[1] translated by Woepcke (*Journ. As.*, 1851) seems to represent Euclid's text, and although the same cannot be said about the proofs supplied by Leonardo of Pisa (Fibonacci), they retain a great deal of the old Greek style. The peculiar fact that shows how, even early in the thirteenth century, geometry, as understood by the ancient Greeks, had become infected by arithmetic, is that Leonardo constantly gives numerical illustrations, and even refers (p. 41, note) to segments defining a given ratio as "numbers," which we may be sure Euclid would not do in this context. Since the editor's translation of Leonardo is not absolutely literal, we must not lay stress on the passage (p. 61):—"Apply a rectangle equal to the rectangle *zb* . *bi*

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[1] This contains the enunciations only.

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